

Hot off the presses!

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A review of the most recent veterinary literature reveals a number of interesting orthopedic surgery articles.

Cranial cruciate ligament rupture

When the late Dr. Barclay Slocum first described the dynamics of the canine cranial cruciate-deficient stifle joint, he measured the angle that the tibial plateau made with the tibial long axis (1,2). He wondered whether this tibial plateau slope (TPS) played a role in the pathogenesis of cruciate ligament rupture; specifically whether dogs suffered cruciate ligament ruptures because they had steeper slopes than the rest of the canine population (1,2). Subsequent studies have shown that the answer is “yes” and “no!” “Yes,” dogs with steep slopes have a high incidence of cranial cruciate ligament (CCL) rupture and specific breeds with higher average slope values have a higher incidence of CCL rupture (3). But “no,” steep slopes aren’t the only problem since dogs with normal, or even below normal slopes, can rupture their CCL and dogs within particular breeds that rupture their CCL don’t have steeper slopes than others of their breed (3). The conclusion has been that steep TPS is but one causative factor in canine CCL rupture.

The natural progression in this line of inquiry is “what leads to steep TPS?” In some cases, the cause is traumatic. Fractures of the proximal tibial physis in the young puppy may result in premature physal closure. If the tibial tuberosity physis remains open it can have the effect of “tipping” the tibial plateau caudally as the pup grows, resulting in a steep slope. Recent research suggests that early neutering (before 6 mo of age) may be another cause of steep TPS (4). Such an observation begs the questions: What is an average TPS? What constitutes a “steep” slope? What is considered early neutering?

Defining an “average” TPS is not a straightforward question, since it seems to be somewhat breed-specific and subject to some interobserver variation (3,5). Published estimates suggest that most dogs have TPS in the low to mid 20 degree range (3,5). Duerr et al (4) considered their control dogs to be those with slopes ≤ 30 degrees and their case dogs having slopes ≥ 35 degrees.

The results showed that dogs with CCL rupture and TPS ≥ 35 degrees were 3 times more likely to have been neutered before 6 mo of age than the control dogs with CCL rupture and TPS ≤ 30 degrees. Case dogs with TPS ≥ 35 degrees in both hind limbs were 13.6 times more likely to have been neutered before 6 mo of age. Case dogs also suffered CCL rupture at a

significantly younger age than control dogs (4).

In examining my own statistics, I have performed 19 tibial plateau leveling osteotomies (TPLO) on 17 dogs with TPS > 30 degrees. This represents 7.5% of total TPLO’s. These cases can be subdivided into 2 groups: Group 1 ($n = 12$) with slopes between 31 and 34 degrees, and group 2 ($n = 5$) with slopes ≥ 35 degrees, as defined by Duerr et al (4). In group 1 there were 12 cases of CCL rupture in 12 dogs. These dogs averaged 42 kg and 5.8 y. Spayed females accounted for 7 cases, while 5 were neutered males. Rupture of the contralateral CCL occurred in 4 dogs (33%) to my knowledge. The mean age at neutering for this group was 187 d (6 mo = 182 d). In group 2, there were 7 cases of CCL rupture in 5 dogs with a mean age of 2.9 y and a mean weight of 33.4 kg. These cases included 4 ruptures in 3 spayed females and 3 ruptures in 2 neutered males. Unfortunately follow-up was not possible or the age at neutering could not be determined for 2 dogs, accounting for 3 cases in this group. The remaining cases had a mean age at neutering of 175 d. Of the 5 dogs in this group, 3 suffered subsequent rupture of the contralateral CCL. While the small number of cases limits the significance of these observations, it is interesting to note that the mean age at the time of neutering and the mean age at TPLO surgery was much lower in group 2 dogs than group 1 and the general population of CCL cases (6). Also, the incidence of contralateral CCL rupture was higher than in group 1 or the general CCL rupture population. It was interesting to note that every dog with a TPS > 30 degrees was spayed or neutered.

Patellar luxation is an infrequent complication of surgery for CCL rupture. A multi-centered study group described 32 cases where patellar luxation occurred 0.18% of the time (7). Patellar luxation, most commonly medial, was noted after extracapsular, intraarticular, and TPLO procedures and was most common in large dogs, especially Labrador retrievers, Newfoundlands, and Rottweilers. The cause of the patellar luxations was not always evident at the time of revision surgery, however, the authors speculated on a number of possible causes. Most commonly implicated are breakdowns of arthrotomy and retinacular incisions post-operatively. Alternatively, excessive tension on the retinacular tissues might exert a pull on the patella. Muscle atrophy affecting the strength of periarticular soft tissues and patellar stability has also been implicated. The authors speculated that incomplete post-operative resolution of cranial tibial thrust or internal rotation of the proximal tibia may predispose some dogs to patellar luxation. The paper noted that successful surgical resolution of the patellar luxation demanded at least 1



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of the following osteotomies: Some form of femoral trochlear sulcoplasty, tibial tuberosity transposition, or TPLO with axial realignment of the tibia. Without at least 1 of these procedures, the relaxation rate was 100% in this group of cases. Even with a corrective osteotomy, the relaxation rate was 21% (7).

Self-tapping screws

Have you ever diligently performed a task, confident in the knowledge that there was a good reason for your efforts, only to subsequently find out that you probably wasted your time? Those of us who were taught to apply bone plates with standard cortical and cancellous bone screws, have spent many hours using taps to cut threads into screw holes, secure in the knowledge that in doing so, we were producing a more secure fit between the bone and screw. Well, to invoke the words of Ira Gershwin "It ain't necessarily so!"

A recent study comparing the holding strength of 2.7 mm self-tapping versus conventional tapped screws in Greyhound metatarsal bones showed no difference (8). This study agrees with previously published results, which presented both in vitro and in vivo data (9). The latest research provides the unique perspective of measuring "push out" strength, compared to previous papers that gauged "pull out" strength. The difference is that to measure pull out strength, the experimentally-placed screw must be left "proud" or incompletely inserted, allowing the screw to be grasped. In the most recent study, the force was applied to the end of the screw protruding from the trans

cortex thus "pushing out" the screw (8). The net result of all this research is that those of us who have so diligently tapped so many screw holes over the years have probably wasted our time. Likely, it will not be long before self-tapping screws are the norm in veterinary orthopedics.

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